

Arazá

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Scientific Name and Introduction: *Eugenia stipitata* Mac Vaugh, known as the arazá (Arkcoll, 1990; Morton, 1987), is a berry from a perennial tree of the *Myrtaceae* family. Two subspecies were described by McVaugh (1956): *stipitata* from Brazil and Peru (also known as araçá-boi in Brazil or as pichi in Peru, the wild one), and *sororia* from Peru (also called *rupina caspi*, the domesticated one). One landrace occurs in the Western Amazon (Gentil and Clement, 1997). Arazá is primarily grown in the Western Amazon, as well as in Costa Rica. There can be four flowering periods per year with 2 mo harvest periods followed by a 1 mo break (Swift and Prentice, 1983). The main harvest season is February to May for the subsp. *stipitata* in Belem, Brazil (Morton, 1987), and two main production seasons exist (March to May and October to December) in Colombia's Northern Amazon, whereas production is year-round in the Southern Amazon.

Quality Characteristics and Criteria: High quality arazá are juicy with bright, canary yellow flesh, bright yellow to orange rind, with no signs of shriveling, bruises or skin scald. The edible portion is slightly fibrous with an exquisite fragrance, but has an extremely sour taste (Arkcoll, 1991). Arazá fruit are noticeable for their high acidity (mostly malate, followed by succinate, and to a lesser extent citrate), minerals, a high ascorbic acid content, and low concentrations of reducing sugars (Gentil and Clement, 1997; Hernández et al., 2001; 2002a; 2002b). Quality defects include susceptibility to anthracnose, scab (*Sphaceloma* sp), rust (*Uromyces* sp.), soft fruit texture, loss of aroma, skin scald at sub-optimum temperatures, and high weight losses, particularly at low RH (Galvis and Hernández, 1993b; Arkcoll, 1991, Tai Chun, 1995). The average number of seeds per fruit and seed length depends on the sub-specie (Ferreira, 1992; Morton, 1987; Swift and Prentice; 1983; Rodriguez, 1990). Thirty volatile compounds have been identified in ripe arazá fruit, with sesquiterpenes and particularly germacrene D the most abundant compounds (Franco and Shibamoto, 2000).

Horticultural Maturity Indices: Fruit are harvested green (Hue angle values above 100°) to avoid fruit softening (Arkcoll, 1991; Galvis and Hernández, 1993a,b). Harvest criteria are primarily size and color, and texture to a lesser extent. If arazá fruit mature on the tree, shelf-life is only about 3 days after harvest.

Grades, Sizes and Packaging: Average fruit range from 100 to 200 g, and equatorial diameters range from 4 to 10 cm (Ferreira, 1992). The domesticated round to oblate fruit from subsp. *sororia* reach from 50 to 800 g, while the wild subsp. *stipitata* reaches 20 to 56 g (Morton, 1987; Rodriguez, 1990). In Colombia, markets pack fruit in baskets of small (< 100 g), medium (150 to 200 g) and large (200 to 350 g) fruit.

Pre-cooling conditions: Arazá should be cooled after harvest to around 13 °C (55.4 °F) within 24 h of harvest in a refrigerated chamber using air with 90 to 95% RH to maximize storability.

Optimum Storage Conditions: The recommended conditions are 12 to 13 °C (53.6 to 55.4 °F) and 90 to 95% RH. Arazá fruit can be kept in good condition for 2 weeks at 12 °C (53.6 °F), 7 days at 10 °C (50 °F), and 5 days at 20 °C (68 °F) (Hernández et al., 2001; 2002b).

Controlled Atmosphere (CA) Considerations: MA reduces weight loss, shriveling, development of skin scald, decay, softening, and the loss of TA (Hernández et al., 2001). Low-density polyethylene (LDPE)

films have been used for MA. However, the effectiveness of MA storage is dependent on maturity, cultivar, temperature and atmosphere. Storage under passive MA using PE film resulted in a steady state reached after 6 days at 10 °C (50 °F) and gas composition of 5 to 6% CO₂ and 13% O₂, depending on the LDPE film used (Hernández et al., 2001). The use of active MA with 5% O₂ and 5% CO₂ with LDPE of 38 µm thickness results in maximum quality, but no recommendation can be made for MA storage. If O₂ decreases < 2%, subsequent ripening in air may be irregular or inhibited.

Retail Outlet Display Considerations: Use of molded plastic trays, as well as individual seal packaging with high OTR films are acceptable. Weight loss at RH < 90% and bruising are serious problems.

Chilling Sensitivity: Arazá fruit are sensitive to chilling temperatures below 12 to 13 °C (53.6 to 55.4 °F). At 8 to 10 °C, fruit should be stored < 5 days to avoid chilling injury.

Ethylene Production and Sensitivity: Ethylene production and sensitivity have not been determined. Fruit are climacteric.

Respiration Rates:

Temperature	Pre-climacteric (mg CO ₂ kg ⁻¹ h ⁻¹)	Climacteric
10 °C	40 to 323	601
13 °C	60 to 337	861
20 °C	140 to 310	1283

To get mL kg⁻¹ h⁻¹, divide the mg kg⁻¹ h⁻¹ rate by 2.0 at 0 °C (32 °F), 1.9 at 10 °C (50 °F), and 1.8 at 20 °C (68 °F). To calculate heat production, multiply mg kg⁻¹ h⁻¹ by 220 to get BTU per ton per day or by 61 to get kcal per metric ton per day. Data are from Galvis and Hernández (1993a,1993b) and Hernández et al. (2002a).

Physiological Disorders: The main disorders are skin scald, browning partly due to bruises, abnormal ripening or uneven to ripe symptoms (blotchy green color, high flesh firmness), lack of flesh juiciness, increase in acidity, and green skin spots (Hernández et al., 2002a; Tai Chun, 1995). CaCl₂ application particularly at > 4% (w/v) can result in abnormal ripening. Green skin spots remain on the fruit, and small brown spots develop which later expand into necrotic lesions that become sites for fungal infection.

Postharvest Pathology: The main rot in arazá is anthracnose (*Gloesporium album*) on wounds or chilling injured (scalded) areas (Arkcoll, 1991; Hernández et al., 2002a; 2002b). *Cylindrocladium scoparium* rot is characterized initially by small light brown lesions, which evolve to severe damaged areas that can reach about 0.3 cm of pulp depth (Nuñez et al., 1995). The pathogenicity of *Curvularia* spp. isolated from rotted fruit is under study, although symptoms are fruit softness and pink spot areas in the pulp with lack of juice and fermentative degradation. The incidence of rust (*Puccinia psidii* or *Uromyces* sp.) has been recorded in Manaus and Costa Rica (Moraes et al., 1994; Tai Chun, 1995). Yeasts are a minor problem with fruit bruises and/or chemical-scalded areas caused by calcium dips of 4 to 8% (Hernández, et al., 2003).

Quarantine Issues: Quarantine pests include *Anastrepha obliqua* and *A. striata* (diptera: tephritidae) (Saldanha and Silva, 1999). The coleoptera *Conotrachelus eugeniae* and *Atractomerus immigrans* have been reported on arazá rinds. *Neosilba zadolicha* (diptera: lonchaeidae) larvae are seldom present on fruit blemishes caused by these insects (Couturier et al., 1996). Mediterranean fruit fly (*Ceratitidis capitata* Wied) has been identified in Costa Rican orchards (Moraes et al., 1994; Swift and Prentice, 1983; Tai Chun, 1995).

Special Considerations: Fruit are highly susceptible to dehydration and shriveling. A warming treatment

of 18 h at 20 °C (68 °F) with 90% RH after 6 days at 10 °C (50 °F) reduces skin scald and associated decay, and extends shelf-life up to 2 weeks (Hernández et al., 1999; 2002b).

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